1. JP 2923002 B

CLAIMS

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(57) [Claim(s)]
[Claim 1] In the raster image-processing system which processes the data described by the Page Description Language, and forms a raster image this system A raster image-processing means to receive the aforementioned data, to create the font data specification information for obtaining the font data of the character contained in these data, and to form a raster image from the obtained font data, The profile data showing a character font access the database accumulated in each form which can be used [equipment] based on font data specification information. The font management tool which incorporates the profile data relevant to this font data specification information, The interface means which carries out the interface of between the aforementioned raster image-processing means and font management tools in a common form independent of a font is included. the aforementioned font management tool It has the 1st accumulation means which stores the aforementioned profile data temporarily. this font management tool If the 1st accumulation means is accessed first and the profile data relevant to this font data specification information exist in the 1st accumulation means according to the aforementioned font data specification information When font data is generated based on this and the profile data relevant to this font data specification information do not exist in the 1st accumulation means While accessing the aforementioned database based on this font data specification information, being based on the profile data relevant to this font data specification information being incorporated and generating font data it is this ******** -- the font characterized by accumulating profile data for the 1st accumulation means -- a free raster image-processing system
[Claim 2] In a system according to claim 1 the aforementioned font management tool It has the 2nd accumulation means which stores temporarily the rasterized alphabetic data which is contained in the raster image by which formation was carried out [aforementioned]. In case the aforementioned raster image-processing means forms a raster image, the rasterized alphabetic data is accumulated for the 2nd accumulation means. If the 2nd accumulation means is accessed in advance of access to the 1st accumulation means and the rasterized alphabetic data relevant to this font data specification information exists in the 2nd accumulation means according to the aforementioned font data specification information It is the raster image-processing system characterized by accessing the 1st accumulation means based on this font data specification information when font data is generated based on this and the rasterized alphabetic data relevant to this font data specification information does not exist in the 2nd accumulation means.
[Claim 3] It is the raster image-processing system characterized by including the 1st storage region as which the 1st accumulation means was beforehand determined among the aforementioned profile data in the system according to claim 1, and which accumulates relatively what has high operating frequency in permanent residence, and the 2nd storage region which accumulates relatively what has low operating frequency in transient.
[Claim 4] It is the raster image-processing system characterized by including a database means to output the profile data relevant to it if it is accumulated in a common form that the aforementioned profile data do not depend for this system on a font in a system according to claim 1 and the aforementioned font data specification information is received.
[Claim 5] It is the raster image-processing system characterized by including the host who creates the data with which this system was described by the aforementioned Page Description Language in the system according to claim 1, and supplies the aforementioned raster image-processing means.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
(Field of the Invention)
this invention relates to a raster image-processing system and the raster image-processing system which more specifically processes the data described by the Page Description Language, and forms a raster image.
(Prior art)
The command data containing a character and image data are created by for example, the application program for publishing, and are changed into the middle stream described by the Page Description Language. This middle stream is changed into a raster image by the interpreter by the raster image-processing (RIP) method, and is outputted to image output units, such as a printer and display, in the form of a page.
In the system handling a character, various fonts exist according to various languages and countries, therefore there are various demands to a font. For example, there is versatility, such as the alphabetic character, a typeface, and not only a size but lateral writing, columnar writing, left writing, right writing, a slanting font, a bold letter, etc. Moreover, when treating a font as a character string, i.e., a document, array methods, such as the method of the array of a character string, for example, proportional-spacing printing etc., also have various demands. Furthermore, various character code sequences are used by the feeder of a font about the code which specifies a character.
A raster image-processing method must carry out satisfaction of these various requirements partially at least. In addition, in this specification, a term "a font" shall be interpreted in the wide sense not only containing the alphabetic character or a font but above various requirements.
Alphabetic-character data are offered in a form peculiar to a font feeder, for example, bit map form, outline (profile) form, etc. Generally font data is accumulated at memory, such as a foreign file and ROM, in the form of the digitized data where the straight line and curve of a profile of a character are specified. If a font is specified by the host by the specific character code, the font data corresponding to it will be read from a file, and scaling processing of expansion or reduction will be performed to it, finally it will be rasterized, and will be changed into an image.
The processing which develops the original data based on bit map form or outline form with a raster image is different in many cases with the form of a font. Moreover, after carrying out the scaling of the original data, the HINTINGU processing which amends length and a radius of circle and is made into a suitable typeface may also change with font formats.
The raster image-processing method peculiar to the classification of a font, i.e., font inclination type mode of processing, was conventionally taken under the environment of such publishing. The conventional printer is connected more to a detail by general interfaces, such as Centronics and RS-232C, at hosts, such as a personal computer and a workstation, including a raster image-processing system and a font data file. That is, the raster image-processing system and font data in a printer are peculiar to a specific printer, and the composition for which a host uses them through a general-purpose printer interface was taken. Moreover, although image display equipments, such as CRT, were connected to the host, the composition for which the data file of the font used with display and the raster image-processing system treating it are contained inside a host, therefore it depends on a host was taken.
(Object of the Invention)
Conventionally, the single raster image-processing system which can respond to various requirements mentioned above in adaptation has not been used so that it may understand from now on. The raster image-processing system peculiar to it was more required for the command data which specific application software uses for a detail. For example, a PostScript interpreter is used for the command data stream by Page Description Languages, such as PostScript (trademark), as a raster image-processing system. That is, font form, specific font processing, and a specific font read-out function were included in the specific raster image-processing system.
Generally, in document handling systems, such as publishing, two or more command data streams are used. Therefore,

in the conventional method, in order to make possible treatment of two or more data streams, the font had to be prepared for every command stream. This caused processing of a font, and duplication creation of a managerial system, and was carrying out induction of the duplication investment of a font.

By the way, in order to accelerate the display of a character, when the alphabetic data which was used at once and rasterized was stored in a cache and the display output of the same alphabetic data was carried out after that conventionally, there was a system which reads and uses this from a cache. By this, the alphabetic data by which multiple-times use is carried out does not need to perform processing which rasterizes font data.

However, as for the rasterization alphabetic data accumulated at a cache, size is fixed to the state where it was used, by this conventional method. Therefore, when using the same character font as a degree in different size, the alphabetic data accumulated at the cache could not be used, but character font data had to be separately fetched from the file. Probably, many storage regions are needed though natural supposing it constitutes a system so that the alphabetic data rasterized in two or more sizes about the same character font may be temporarily accumulated into a cache. This inclination is remarkable about a font with many types of letters like the kanji.

this invention can cancel the fault of such conventional technology, high-speed character representation can be performed, and it aims at offering the raster image-processing system independent of a font.

(The means for solving a technical problem)

According to this invention, the raster image-processing system which processes the data described by the Page Description Language, and forms a raster image A raster image-processing means to receive the aforementioned data, to create the font data specification information for obtaining the font data of the character contained in this data, and to form a raster image from the obtained font data, The profile data showing a character font access the database accumulated in each form which can be used [equipment] based on font data specification information. The font management tool which incorporates the profile data relevant to font data specification information, The interface means which carries out the interface of between a raster image-processing means and font management tools in a common form independent of a font is included. a font management tool It has the 1st accumulation means which stores profile data temporarily. a font management tool If the 1st accumulation means is accessed first and the profile data relevant to font data specification information exist in the 1st accumulation means according to font data specification information When font data is generated based on this and the profile data relevant to font data specification information do not exist in the 1st accumulation means A database is accessed based on font data specification information, and while being based on the profile data relevant to font data specification information being incorporated and generating font data, the incorporated profile data are accumulated for the 1st accumulation means.

Moreover, according to this invention, a font management tool has the 2nd accumulation means which stores temporarily the rasterized alphabetic data which is contained in the formed raster image. In case a raster image-processing means forms a raster image, the rasterized alphabetic data is accumulated for the 2nd accumulation means. If the 2nd accumulation means is accessed in advance of access to the 1st accumulation means and the rasterized alphabetic data relevant to font data specification information exists in the 2nd accumulation means according to font data specification information When font data is generated based on this and the rasterized alphabetic data relevant to font data specification information does not exist in the 2nd accumulation means, the 1st accumulation means is accessed based on font data specification information.

Furthermore, according to this invention, the 1st accumulation means contains the 1st storage region which was beforehand defined among profile data and which accumulates relatively what has high operating frequency in permanent residence, and the 2nd storage region which accumulates the low thing of operating frequency in transient relatively.

(Operation)

If the data described by the Page Description Language are inputted into a raster image-processing system from a host according to this invention, a raster image-processing means will create the font data specification information for obtaining the font data of the character contained in this data. A font management tool accesses the 1st accumulation means first according to font data specification information. If this profile data exists in the 1st accumulation means, font data will be generated based on this. However, when it does not exist, a database is accessed based on font data specification information, the profile data relevant to the font data specification information are incorporated, and font data is generated based on this. The profile data incorporated with this are accumulated for the 1st accumulation means.

A raster image-processing means forms a raster image from the profile data obtained in this way. Finally the formed raster image is outputted to a raster image output unit or a communication device.

(Example)

Next, with reference to an accompanying drawing, the example of the raster image-processing system by this invention is explained in detail. As for this example, fundamentally, reference of a view 1 connects both mutually by connectors 14 and 16 including the module package 12, i.e., a RIP processing module, which performs raster image processing (RIP) with the host 10 who consists of processing systems, such as a personal computer and a workstation. A host 10 is a processor general-purpose in this example which creates the command data containing a character and image data by the application program 50 (view 2) for publishing, and changes them into the middle stream described by the Page Description Language.

The image display equipment 18 which indicates a character and pictures, such as CRT, by visible is connected to the host 10. moreover, the printer 20 is connected to the host 10 and (or) the RIP processing module 12 A printer 20 is a picture output unit which carries out visible record of a character and the picture at a record medium. Of course, although a host 10 also contains I/O devices, such as a keyboard, like the usual processing system, since these are not directly related to an understanding of this invention, they omit illustration and explanation.

It is characteristic by display 18 and the printer 20 that the font data used common to visualization of a character is stored in the foreign files 22, such as a fixed disk, a floppy, or an integrated-circuit board, in this system. That is, it is not dependent on display 18 or a printer 20, and these font data can be used in common as a database. Of course, what can access a distant database not only through storage peculiar to a host 10 but through a communication line is sufficient as a foreign file 22. Therefore, while a font is not dependent on a RIP processor, for example, there is wide range expandability from roman to the kanji, on the other hand, a RIP processor becomes independent of a character coding scheme.

The RIP processing module 12 contains a RIP processing system so that it may explain in full detail behind. This point is also one of the important features of this example. A host 10 can perform various application software 50 for publishing. Therefore, according to those application software 50, the command data stream 24 of various kinds is inputted into the RIP processing module 12. Moreover, the font data of a foreign file 22 is read dynamically if needed for the RIP processing module 12, and is loaded to the RIP processing module 12. The RIP processing module 12 gives suitable raster image processing according to the kind to the command data stream 24, and outputs it to a host 10 or a printer 20 as a raster image data 26. Even if this data 26 is the form by which the data compression was carried out, it may be a form which is not compressed.

The RIP processing module 12 includes the specific composition for two function parts, the RIP processing 52 and the font management 54, fundamentally, as shown in a view 2. The interface of the application software 50 is carried out to the RIP processing 52 with the soft interface 56.

The RIP processing 52 creates font data specification information required to take out the font data of the character specified with specific application software 50. By this example, the typeface based on specification of a font feeder, a character coding scheme, a character code, a character size, etc. are contained in this font data specification information. With a typeface, if it is a kanji, for example, if it is Japanese, by the character coding scheme, the exception of JIS83 or Shift JIS etc. will be specified exceptions, such as a Mincho typeface and Gothic.

The interface 58 between the RIP processing 52 and the font management 54 takes the communalized interface independent of a font. An interface 58 contains above-mentioned font data specification information and font data. Font data is loaded to the field 60 in a module 12 from the database of a foreign file 22 according to a demand. Therefore, the font access path in the font management 54 can take the optimal path according to a character coding scheme. The font management 54 performs font processing of expanding or reducing font data 60 to the size which is the form of font data as it is, or is demanded by character-size data, and outputs font data to the RIP processing 52.

In this example, the storage region 60 of font data contains two high-speed storage regions, the profile character cache 100 and the rasterization character cache 102, as shown in a view 3. The profile character cache 100 is a field where it is accumulated temporarily, the data, i.e., the profile data, showing the profile of the character font read from the font database 22. This profile data is a size free-lancer fundamentally, and is used, being changed into the alphabetic data by which the desired size was rasterized behind.

The rasterization character cache 102 is a storage region by which the alphabetic data of the result by which the profile data stored in the profile character cache 100 were rasterized by the image of a desired size is accumulated. Variable power of the image data stored in the rasterization character cache 102 is carried out to a desired size. In addition, rasterization is performed by the RIP processing 52 like the after-mentioned. Thus, in this example, the profile data read from the font database 22 are stored in the profile character cache 100, and the character cache is hierarchized by two level so that the alphabetic data rasterized next may be stored in the rasterization character cache 102. However, the rasterization character cache 102 does not necessarily need to be formed and may take the system configuration only containing the profile character cache 100 about a character cache.

Further, the profile character cache 100 contains two fields 104, i.e., a resident area, and a transient area 106 by this

example, as shown in a view 4. A resident area 104 is a storage region which accumulates the profile data of a character font with high operating frequency relatively like a hiragana for example, in a Japanese system. The profile data of a character with high operating frequency are read into a resident area 104 from the font database 22 in the case of initial setting of a system. The profile data read into the resident area 104 are always held and used for this field 104.

A transient area 106 is a storage region which accumulates the profile data of a character font with low operating frequency relatively. For example, the alphabetic data of the kanji is accumulated to this field 106, when the specific kanji is accessed by the font database 22 for the first time. The storage capacity of a transient area 106 is limited. Then, there is a method of being FIFO operation which eliminates the alphabetic data read in ancient times, when it accumulates sequentially from what was most read into recently, for example and is accumulated to the limit of storage capacity, and performing read-and-write control per character. Or counting of each usage count of the profile data stored in the transient area 106 may be carried out, and you may constitute so that it may eliminate sequentially from the fewest data of a usage count.

As for the font management 54, in this example, being based on management of an one-character unit is desirable. This is for making the access mechanism of the font data which it had by the command stream according to each application software with the conventional technology absorb by the font management 54 in this example. When the scaling of the font data is carried out, the length of the segment which forms the profile of a character may become irregular, or smoothness may lack in a radius of circle. In such a case, HINTINGU processing which amends length and a radius of circle and is made into a suitable typeface is also performed by the font management 54.

The RIP processing 52 rasterizes the font data received from the font management 54. The rasterized image data is accumulated at an image / frame memory 62, and is assembled by the image data of a page unit. An image / frame memory 62 is storage regions which accumulate a raster image data for example, per page temporarily.

The interface of an image / the frame memory 62 is carried out to a printer 20 and display 18 through the video interface 64. Moreover, an interface is carried out by picture compression 68 to output units by which an interface is carried out in compressed data form, such as printer 20a and facsimile 66. To a host 10, the RIP processing module 12 is connected by bus, and this bus connection is performed through the hardware bus interface 70.

Operation is explained. First, if a power supply is supplied to equipment, the RIP processing 52 will access the font database 22, will read relatively the character font of high operating frequency, for example, the profile alphabetic data of the Japanese syllabary, into the profile character cache 100, will accumulate these to the resident area 104, and will equip next use with them.

The command data containing a character and image data are created by application software 50, and are changed into the middle stream described by the Page Description Language. This middle stream is inputted into the RIP processing 52 through a software interface 56. In the RIP processing 52, font data specification information required to access the font data of the character contained in this command stream is created, and this is given to the font management 54.

The font management 54 accesses the rasterization character cache 102 first based on font data specification information. If the rasterization alphabetic data of a required character size exists in a cache 102, the font management 54 will incorporate it. If there is no rasterization alphabetic data of a required character size in a cache 102, the font management 54 will access the profile character cache 100, and it will be incorporated if the data exists in a cache 100. For example, a hiragana always comes to hand in the form of profile data from this cache 102 at this example. When required profile data exist in neither of both the caches 100 and 102, the font management 54 is accumulated also into the profile character cache 100, and next use is equipped with it while it accesses the font database of a foreign file 22 and incorporates required font data. For example, the profile data is read into the transient area 106 of the profile character cache 100 about character fonts with comparatively low operating frequency, such as a kanji.

It is the form of font data as it is, or expands or reduces to required size, and the font management 54 outputs the font data of the profile character cache 100 to the RIP processing 52. The profile data of a resident area 104 to others are read for the profile data with high operating frequency, such as the Japanese syllabary, from a transient area 106.

In the RIP processing 52, the font data received from the font management 54 is rasterized, and it once accumulates to an image / frame memory 62 as document data. In that case, the rasterized character font is stored also in the rasterization character cache 102 of the font data storage region 60, and subsequent use is equipped with it. In this way, the image data of a page unit is assembled by an image / frame memory 62.

Coding compression is carried out by picture compression 68 when the raster image accumulated at the image / frame memory 62 is outputted through the video interface 64 when outputting to a printer 20 or display 18, and outputting to communication devices, such as printer 20a or facsimile 66. In this way, the command data stream from application software 50 is changed into a raster image by the RIP processing module 12, for example, is outputted to image output units, such as a printer 20 and display 18, in the form of a page.

At this example, in this way, the profile character cache 100 is formed and font data is accumulated in the form of the profile alphabetic data before being rasterized at this. This profile alphabetic data is accessed at every need for use behind, variable power of it is carried out to a desired size, it is rasterized, and is outputted as an image data. Therefore, as compared with the method with which only the conventional rasterization cache was formed, it can be adapted for all character sizes with few character cache storage capacity. In this example, since the profile character cache 100 has taken the layered structure with the rasterization character cache 102, an efficient character cache is realized again.
(Effect of the invention)
According to this invention, the cache which stores the profile data of a character font temporarily is formed in this way, and font data is accumulated in the form before being rasterized at this. The profile data accumulated at the cache are accessed at every need for use behind, variable power of them is carried out to a desired size, they are rasterized, and are formed in an image data. Therefore, it can be adapted for all character fonts with few character cache storage capacity. When such a profile character cache has taken hierarchy memory structure with the rasterization character cache, a still more efficient character cache control system is realized. In this invention, further, RIP processing and font management are separated constitutionally and the interface between both can take a common form independent of a font.


[Translation done.]

DRAWINGS
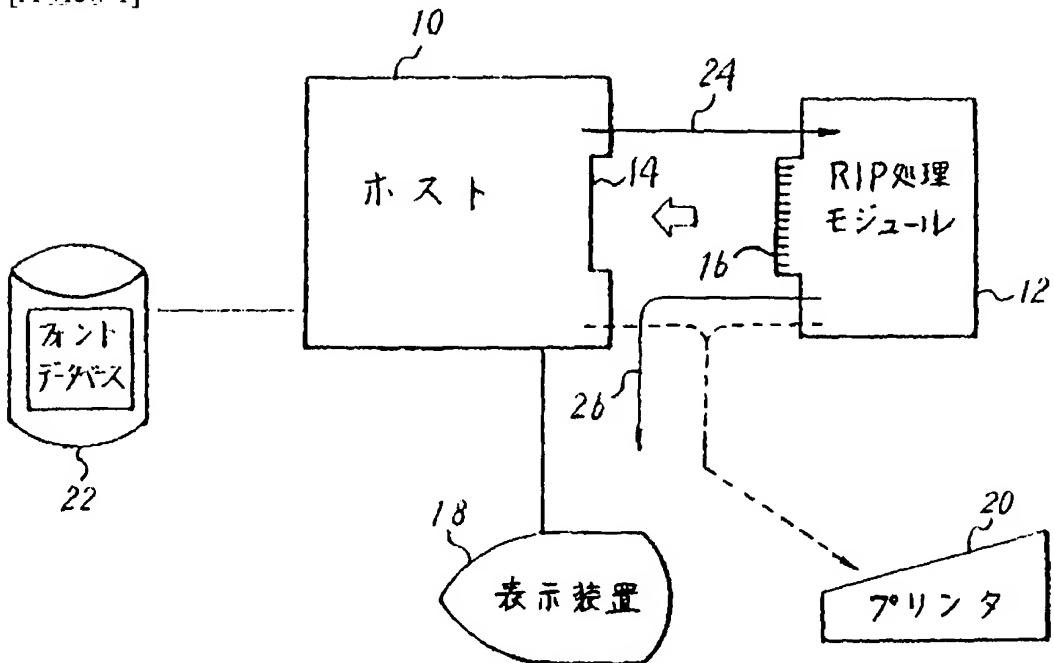
[A view 1]

フォントフリーなラスタイメージ処理システム

[A view 2]
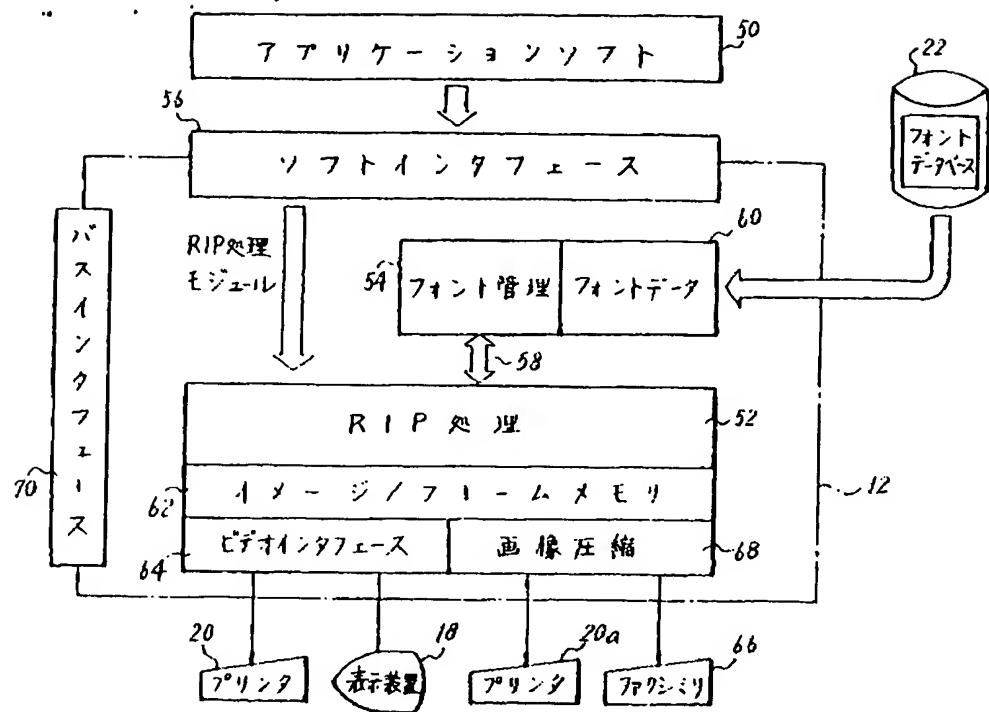
RIP処理モジュールの構成例

[A view 3]

文字キャッシュの構成例

[A view 4]

100

常 駐 領 域
（ひらがな など）

104

非 常 駐 領 域
（ＦＩＦＯ）

106
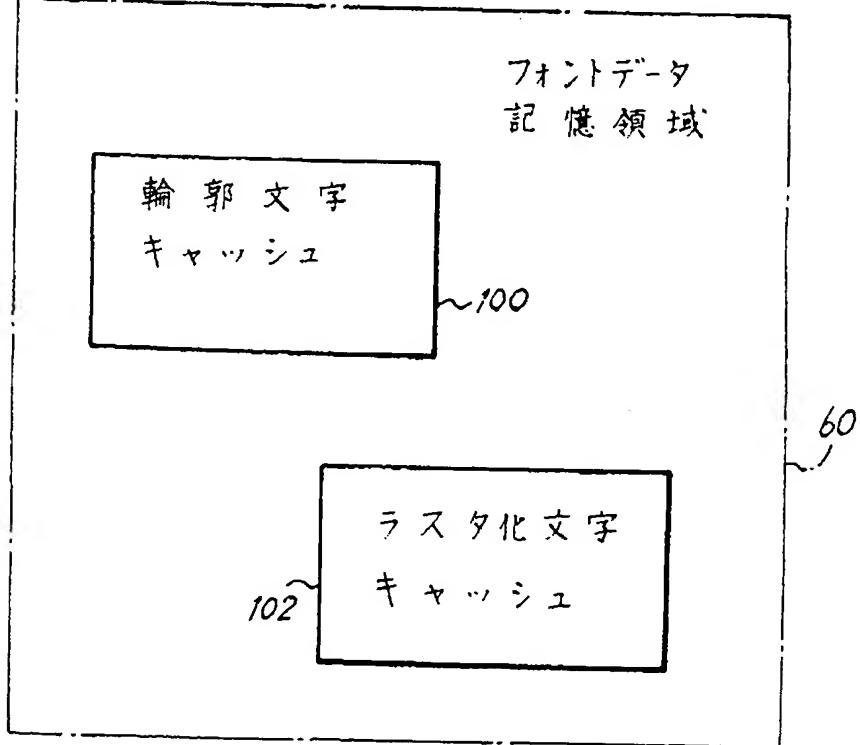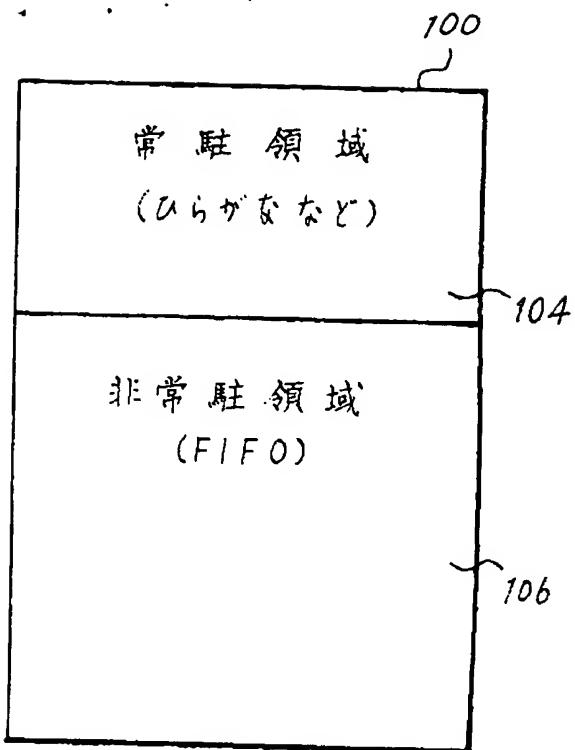
輪郭文字キャッシュの構成例

[Translation done.]